

Atty. Dkt. No. 039153-0484 (G1190)

REMARKS

Applicants respectfully request reconsideration of the present application in view of the foregoing amendments and in view of the reasons that follow.

No claims are currently being amended.

This amendment does not add, change and/or delete claims in this application. A detailed listing of all claims that are, or were, in the application, irrespective of whether the claim(s) remain under examination in the application, is presented, with an appropriate defined status identifier.

Claims 1-20 remain pending in this application.

On pages 1-4 of the Office Action, claims 5, 8-10, 12-13, 15-17, and 19-20 are rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent Application Publication No. 2005/0124,154 (Park). The Examiner states:

Claims 5, 8-10, 12-13, 15-17, 19-20 are rejected under 35 U.S.C. 102(e) as being anticipated by Park et al. (U.S. Patent No. 2005/0124154).

Referring to figures 1-3, Park et al. teaches a method of using an adhesion precursor in an integrated circuit fabrication process, the method comprising:

Providing a first gas over a dielectric material (210) to form an adhesion precursor layer (230, see paragraphs# 22-23 depositing the layer by using CVD ones has to use gas for deposition), the dielectric material including an aperture (120), the first gas including a ternary element of Iridium, Ruthenium, or Rhenium (see paragraphs# 22-23);

Providing a second gas including over the adhesion precursor layer (240) includes tin, indium, zinc, or chromium (see paragraph# 25); and

provide a copper layer (370) over the adhesion precursor layer (see paragraph# 28).

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Regarding to claim 9, an alloy layer (240) above the adhesion layer (230, see paragraph# 25).

Regarding to claim 12, the bending layer includes an alloying material (240, see paragraph# 25).

Regarding to claim 13, adhesion precursor layer comprise a barrier layer that includes a tantalum nitride, tungsten nitride or disilicon nitride (see paragraph# 22).

Regarding to claim 15, forming a continuous barrier adhesion precursor layer above the dielectric layer and along sides of the trench (230, see figure 2a).

Regarding to claim 17, providing a chemical mechanical polish to level the copper to substantially the same level as the continuous barrier layer above the dielectric layer (see paragraph# 31).

Applicants respectfully traverse the rejection.

On pages 3-5 of the Office Action, claims 7-20 are rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,713,373 (Omstead). The Examiner states:

Referring to figures 2-11, Omstead teaches a method of using an adhesion precursor in an integrated circuit fabrication process, the method comprising:

Providing a first gas over a dielectric material (304) to form an adhesion precursor layer (404, depositing the layer by using CVD ones has to use gas for deposition), the dielectric material including an aperture (308), the first gas including a ternary element of Iridium, Ruthenium, or Rhenium (see col. 3, lines 50-58); and

Providing a second gas including an alloying agent over the adhesion precursor layer to provide a copper layer (604/704) over the adhesion precursor layer (see col. 4, lines 37+, noted CVD process ones has to use gas for deposition).

Regarding to claim 7, first gas material is layer (404, RuO₂), second layer of material is (RuO_x, see col. 4, lines 15-36), the third gas including an alloy element (see col. 3, lines 38-40, col. 4, lines 15-36), and forming a copper layer (704).

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Regarding to claim 18, the adhesion precursor layer has a thickness of 10-100 Angstroms (see col. 6, lines 1-6).

Regarding to claim 8, providing a second gas of a second material over the adhesion precursor layer (Ruthenium, 504 by CVD).

Regarding to claim 13, adhesion precursor layer comprise a barrier layer that includes a tantalum nitride, tungsten nitride or disilicon nitride (see col. 6, lines 15-48).

Regarding to claim 14, the alloy layer has a thickness of up to 50 Angstroms (Ruthenium of the bilayer 504, see col. 6, lines 1-6).

Regarding to claim 15, forming a continuous barrier adhesion precursor layer above the dielectric layer and along sides of the trench (404, see figure 4).

Regarding to claim 17, providing a chemical mechanical polish to level the copper to substantially the same level as the continuous barrier layer above the dielectric layer (see col. 5, lines 26-30).

Applicants respectfully traverse the rejection.

On page 5 of the Office Action, claims 1-4, 6, and 14 are rejected under 35 U.S.C. § 103 as being unpatentable over Park or Omstead in view of U.S. Patent Publication No. 2004/0192,021.

Referring to figures 2-11, Omstead teaches a method of using an adhesion precursor in an integrated circuit fabrication process, the method comprising:

Providing a first gas over a dielectric material (304) to form an adhesion precursor layer (404, depositing the layer by using CVD ones has to use gas for deposition), the dielectric material including an aperture (308), the first gas including a ternary element of Iridium, Ruthenium, or Rhenium (see col. 3, lines 50-58); and

Providing a second gas including an alloying agent over the adhesion precursor layer to provide a copper layer (604/704) over the adhesion precursor layer (see col. 4, lines 37+, noted CVD process ones has to use gas for deposition).

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And also Park et al. teaches a method of using an adhesion precursor in an integrated circuit fabrication process, the method comprising:

Providing a first gas over a dielectric material (210) to form an adhesion precursor layer (230, see paragraphs# 22-23 depositing the layer by using CVD ones has to use gas for deposition), the dielectric material including an aperture (120), the first gas including a ternary element of Iridium, Ruthenium, or Rhenium (see paragraphs# 22-23);

Providing a second gas including over the adhesion precursor layer (240) includes tin, indium, zinc, chromium (see paragraph# 25); and

provide a copper layer (370) over the adhesion precursor layer.

However, the reference does not teach forming a copper layer film by providing a gas including an alloying agent.

Li teaches forming a copper alloy layer by using atomic layer chemical vapor deposition to deposit on the barrier/adhesion layer (see paragraph# 9, 79, noted that the CVD or PEALD are deposition using gas).

Therefore, it would have been obvious to a person of ordinary skill in the requisite art at the time of the invention was made would form a layer copper alloy form the alloy agent in process of Omstead or Park et al. as taught by Li because the copper alloy layer would increase the hardness of copper film and also reduce electromigration.

Applicants respectfully traverse the rejection.

Applicants respectfully submit that Kim and Omstead are not prior art. Applicants have submitted herewith a Declaration from Sergey D. Lopatin, Paul R. Besser, Alline F. Myers, Jeramias D. Romero, Minh Q. Tran, Lu You and Pin-Chin Connie Wang, the inventors listed in the present application, to remove Kim and Omstead as prior art. The declaration refers to an invention disclosure form that demonstrates that the base subject matter of the present application was in the possession of the inventors before the filing dates of Kim and Omstead. More specifically, the invention disclosure form shows that the base subject matter was

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conceived by at least the date August 21, 2001, the date of a patent harvesting session during which the AMD invention disclosure form was received by the Assignee's technology law department. Thus, it is respectfully submitted that claims 1-20 are allowable over the Kim and Omstead because Kim and Omstead do not qualify as prior art under 35 U.S.C. § 102(e) based upon the Rule 131 declaration submitted herewith. Accordingly reconsideration and withdrawal of rejection of claims 1-20 under 35 U.S.C. §§ 102(e) and 103 in view of the cited art is respectfully requested.

Applicants believe that the present application is now in condition for allowance. Favorable reconsideration of the application as amended is respectfully requested.

The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

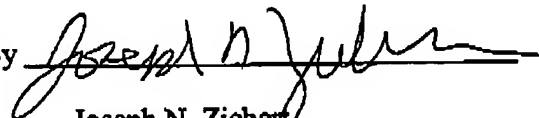
The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 06-1447. Should no proper payment be enclosed herewith, as by a check being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 06-1447. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicants hereby petition for such extension under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 06-1447.

Respectfully submitted,

Date

1-30-2006

By



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